EO/US
PCT/GB00/01561

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing: 14 December 2000 (14.12.00)	
International application No.: PCT/GB00/01561	Applicant's or agent's file reference: K.SAMARAS 8-
International filing date: 20 April 2000 (20.04.00)	Priority date: 09 June 1999 (09.06.99)
Applicant: SAMARAS, Konstantinos et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International preliminary Examining Authority on:

25 September 2000 (25.09.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer: J. Zahra
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

Form PCT/IB/331 (July 1992)

3707862

EDGE was initially developed in order to provide data service at higher rates than GSM or GPRS, by making use of multi-phase modulation (such as 8-PSK) instead of binary GMSK. However, the structure of the proposed RLC/MAC blocks for data transmission do not allow for the efficient use of the available radio resources for voice transmission. Furthermore, due to the use of 8-PSK more powerful channel coding is required in order to maintain certain levels of voice quality .

The use of more powerful channel encoding techniques generates a larger number of encoded bits. If the number of bits encoded exceeds the number of bit spaces available, then puncturing is usually applied to remove certain bits. A performance trade off therefore exists between providing a powerful channel coding technique, but minimising the number of bits to be punctured.

It is therefore an object of the present invention to provide an improved encoding technique suitable for efficient channel encoding of voice on an EDGE network.

Summary of the Invention

According to the present invention there is provided a method of encoding at least two sets of data bits into a single encoded block, wherein each set of data bits includes a primary set of bits to be encoded and a secondary set of bits to remain unencoded, wherein the encoding technique requires a set of code terminating bits to be added to the primary set of bits, the method comprising: combining the two sets of primary bits; and encoding the combined two sets of primary bits, whereby one set of code terminating bits is added to the combined two sets of primary bits.

The two sets of data bits may each include a header portion and a payload portion, the payload portion comprising encoded speech. The encoding step may be a channel encoding step for encoding the at least two sets of data bits for transmission on a packet switched network. The data bits may be for

7. The encoder of claim 5 or claim 6 wherein at least two sets of data bits each include a header portion and a payload portion, the payload portion including encoded speech and the single encoded block being an RLC/MAC block.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
K.SAMARAS 8-8		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB00/01561	20/04/2000	09/06/1999
International Patent Classification (IPC) or national classification and IPC H04L1/00		
Applicant LUCENT TECHNOLOGIES INC. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
25/09/2000	03.09.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Snell, T Telephone No. +49 89 2399 8802

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/01561

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1,3-43	as originally filed			
2	as received on	30/07/2001	with letter of	26/07/2001

Claims, No.:

1-6	as originally filed			
7	as received on	30/07/2001	with letter of	26/07/2001

Drawings, sheets:

1/23-23/23	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:
   ☐ the claims, Nos.:
   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-7
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-7
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-7
	No:	Claims	

2. Citations and explanations
   see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Cited Documents

D1: US-A-5 432 778 (MINDE TOR B ET AL) 11 July 1995 (1995-07-11)
D2: US-A-5 867 209 (KURAHASHI SHIGEKI ET AL) 2 February 1999 (1999-02-02)
D3: US-A-5 815 507 (ARORA ARVIND S ET AL) 29 September 1998 (1998-09-29)

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The invention concerns a method of encoding bits suitable for use in an EDGE mobile communications system. The closest prior art is formed by the commonly known specification for EDGE systems, based on the GSM air interface. In the GSM system, voice signals are encoded with class I and class II bits (primary and secondary bits), according to their importance, the class I bits being encoded subsequently by convolutional encoder. In EDGE, the use of 8-PSK allows a much higher data rate than GSM, but for voice more powerful channel coding is required to maintain voice quality level.

2. The aim of the invention is to provide an efficient coding technique suitable for the encoding of voice on an EDGE network.

3. The invention differs over prior art EDGE systems in that two sets of primary bits are combined and encoded together, thus requiring only one set of terminating bits.

4. None of the prior art documents suggests the combining and encoding of two sets of primary bits derived from two sets of bits each having primary and secondary bits. D1 refers to a system using the known GSM air interface. Although it describes class 1a and class 1b bits, these are not derived from two sets of bits each having primary and secondary bits, and in any case they are not encoded together. D2 has a transmission system for voice an image data, but each block is either a voice, image or control block and are CRC coded individually, thus no sets are combined for joint coding. D3 is concerned only with error detection.

Compared with the available prior art, the subject-matter of claim 1 is therefore considered both novel and to involve an inventive step (Articles 33(1)-(3) PCT).

5. Claim 5 is for an encoder with features corresponding to method claim 1; claim 6 is for a packet switched network including the encoder of claim 5. Claims 2-4 and 7 are dependent on either claims 1 or 5.

Claims 2-7 therefore also meet the requirements for novelty and inventive step (Articles 33(1)-(3) PCT).

Re Item VII

Certain defects in the international application

1. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

Re Item VIII

Certain observations on the international application

1. Claim 1 does not meet the requirements of Article 6 PCT; the reason for this objection is the following:

Claim 1 is broader than justified by the scope of the description and drawings; claim 1 is thus not supported by the description. The description relates clearly to EDGE systems, the aim of the invention being defined on page 2 as originally filed as "to provide an improved encoding technique suitable for efficient channel encoding of voice on an EDGE network". Since the whole impression conveyed by the application is that the invention relates to a specific system, and it is not apparent that a skilled person could extend the teaching across the whole of the field of encoding data having primary and secondary sets of bits, then objection arises (cf PCT Guidelines III-6.4).

Moreover claim 1 is not clear; without the limitations to specifically EDGE networks and to voice data, it is entirely unclear how to interpret the scope of the terms "primary" and "secondary" set of bits. Eg in a data transmission network the primary bits could be headers and the secondary bits a data payload, which is clearly not what is described in the present application.

Claim 1 should therefore have been limited to a method for use in an EDGE network, wherein voice signals are coded in the form of a set of bits, the set of bits comprising a primary and a secondary sets of bits.

2. Claim 5 lacks clarity and support by the description for the same reasons (Article 6 PCT).

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
K.SAMARAS 8-		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/GB 00/ 01561	20/04/2000	09/06/1999
Applicant		
LUCENT TECHNOLOGIES INC. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

   [ ] the text is approved as submitted by the applicant.

   [X] the text has been established by this Authority to read as follows:

   UNEQUAL ERROR PROTECTION FOR PACKET SWITCHED NETWORKS

5. With regard to the **abstract,**

   [ ] the text is approved as submitted by the applicant.

   [X] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 10

   [X] as suggested by the applicant.

   [ ] None of the figures.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 00/01561

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

A method of encoding at least two sets of data bits into a single encoded block is provided, wherein each set of data bits includes a primary set of bits to be encoded and a secondary set of bits to remain unencoded, wherein the encoding technique requires a set of code terminating bits to be added to the primary set of bits; the method comprising: combining the two sets of primary bits, whereby one set of code terminating bits is added to the combined two sets of primary bits.

The two sets of data bits may each include a header portion and a payload portion, the payload portion comprising encoded speech. The encoding step may be a channel encoding step for encoding the at least two sets of data bits for transmission on a packet switched network.The data bits may be for transmission on an EDGE packet switched network, wherein the at least two sets of data bits are encoded into a single RLC/MAC block.

INTERNATIONAL SEARCH REPORT

International Application No
P[redacted]B 00/01561

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, COMPENDEX, INSPEC, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 432 778 A (MINDE TOR B ET AL) 11 July 1995 (1995-07-11) column 3, line 20 - line 63 figure 1	1,3-6
Y		2,7
Y	US 5 867 209 A (KURAHASHI SHIGEKI ET AL) 2 February 1999 (1999-02-02) figure 6	2,7
A	US 5 815 507 A (ARORA ARVIND S ET AL) 29 September 1998 (1998-09-29) column 1, line 23 - line 49 column 3, line 42 - line 44 column 4, line 46 -column 5, line 39 figure 2	1-7

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 July 2000	02/08/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Ghigliotti, L

1

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 00/01561

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5432778 A	11-07-1995	SE 470372 B	31-01-1994
		AU 663965 B	26-10-1995
		AU 4517093 A	24-01-1994
		BR 9305555 A	08-11-1994
		CA 2114715 A	06-01-1994
		CN 1081298 A	26-01-1994
		EP 0612453 A	31-08-1994
		FI 940828 A	22-02-1994
		JP 6510413 T	17-11-1994
		MX 9303653 A	31-01-1994
		NZ 253806 A	27-08-1996
		SE 9201923 A	24-12-1993
		WO 9400938 A	06-01-1994
		SG 43785 A	14-11-1997
US 5867209 A	02-02-1999	JP 8195944 A	30-07-1996
US 5815507 A	29-09-1998	FR 2748169 A	31-10-1997
		GB 2312359 A,B	22-10-1997
		IT RM970213 A	14-10-1998

INTERNATIONAL SEARCH REPORT

Interl[illegible] Application No
PCT/GB 00/01561

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, COMPENDEX, INSPEC, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 5 815 507 A (ARORA ARVIND S ET AL) 29 September 1998 (1998-09-29) column 1, line 23 - line 49 column 3, line 42 - line 44 column 4, line 46 -column 5, line 39 figure 2	1-7

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☒ Patent family members are listed in annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 July 2000	02/08/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Ghigliotti, L

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter: Application No
PCT/GB 00/01561

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5432778 A	11-07-1995	SE 470372 B	31-01-1994
		AU 663965 B	26-10-1995
		AU 4517093 A	24-01-1994
		BR 9305555 A	08-11-1994
		CA 2114715 A	06-01-1994
		CN 1081298 A	26-01-1994
		EP 0612453 A	31-08-1994
		FI 940828 A	22-02-1994
		JP 6510413 T	17-11-1994
		MX 9303653 A	31-01-1994
		NZ 253806 A	27-08-1996
		SE 9201923 A	24-12-1993
		WO 9400938 A	06-01-1994
		SG 43785 A	14-11-1997
US 5867209 A	02-02-1999	JP 8195944 A	30-07-1996
US 5815507 A	29-09-1998	FR 2748169 A	31-10-1997
		GB 2312359 A,B	22-10-1997
		IT RM970213 A	14-10-1998